Rio Algom Mining LLC

August 16, 2016

Mr. Jeffrey Whited
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Material Safety and Safeguards
Two White Flint North, Mailstop T-8F05,
11545 Rockville Pike,
Rockville, MD 20852
Docket Number: 40-8905

04008905

Request for Cessation of Components of the Environmental Monitoring Program at the Ambrosia Lake Facility License Number SUA-1473

Dear Mr. Whited,

Rio Algom Mining LLC (RAML) is requesting NRC's concurrence to terminate components of the environmental monitoring program at the Ambrosia Lake Facility (the site). Specifically, this request is for the following routine monitoring components:

- Quarterly airborne radioparticulate sampling
- Quarterly airborne radon-222 sampling
- Quarterly environmental dose monitoring using passive dosimeters at air sampling locations
- Quarterly vegetation sampling at air sampling locations, and
- Annual soil sampling at air sampling locations
- Annual sediment sampling

No changes to the groundwater monitoring program at the site are being proposed at this time.

The rationale for this request is that most if not all of the licensed radioactive material has been consolidated and covered in accordance with NRC approved plans and the existing data demonstrate that radionuclide concentrations in the environmental media listed above are low. A detail discussion of this rationale is provided in the enclosed report.

In the future, if any site licensed activity has a potential for occupational exposure or environmental release of licensed radioactive materials, a radiation work permit will be issued that describes the hazards, controls to mitigate hazards, and monitoring techniques used to evaluate the controls. In these cases, components of the current environmental monitoring program may be re-instituted for the duration of the activity.

We look forward to the NRC's prompt written concurrence that these monitoring programs can be terminated based on the decommissioning status of the site with no consequence to human health and the environment.

NMSS01

designated as original JAW

P.O. Box 218, Grants, NM USA 87020 - Tel: 505.287.8851 - Fax: 505.285.5550

Please contact me at (209)736-4803 with any questions.

Best Regards,
Rio Algom Mining LLC

Theresa Ballaine
Manager

cc: Document Control

REQUEST FOR REVISED ENVIRONMENTAL MONITORING

FOR THE

RIO ALGOM MINING AMBROSIA LAKE FACILITY

Prepared for:

Rio Algom Mining, LLC Ambrosia Lake

PO Box 218

Grants, New Mexico USA 87020

Prepared by:

Environmental Restoration Group, Inc.

8809 Washington St NE Suite 150

Albuquerque, New Mexico 87113

August, 2016

Table of Contents

Tables

Figures

Table of Contents (concluded)

Acronyms

CFR	Code of Federal Regulations
ERG	Environmental Restoration Group, Inc.
Facility	Ambrosia Lake Facility
LLD	lower limit of detection
µCi/g	microcuries per gram
µCi/kg	microcuries per kilogram
µCi/ml	microcuries per milliliter
mrem	millirem
NA	not applicable
NRC	U.S Nuclear Regulatory Commission
OSL	optically stimulated luminescent
Pb-210	lead-210
pCi/g	picocuries per gram
pCi/L	picocuries per liter
Po-210	polonium-210
RAML	Rio Algom Mining, LLC
RG	Regulatory Guide
Rn-222	radon-222
Th-230	thorium-230
Uranium	natural uranium

1.0 Introduction

On behalf of Rio Algom Mining, LLC (RAML), Environmental Restoration Group, Inc. (ERG) assessed the need for continuing the environmental monitoring that is being conducted under Radioactive Materials License SUA-1473 at the RAML Ambrosia Lake Facility (facility) in McKinley County, New Mexico. As part of this assessment, ERG reviewed the environmental monitoring data, excluding groundwater, obtained at the facility from 2008 to 2015 while taking into account the current state of its decommissioning. This report makes recommendations regarding the utility of each aspect of the environmental monitoring program.

The facility is located in the Ambrosia Lake mining district in the southeastern part of McKinley County, New Mexico (Figure 1-1), approximately 25 highway miles from Grants on Highway 509. Numerous mining companies were located in the Ambrosia Lake mining district of the Grants uranium belt. At one time, there were two mills that processed uranium ore and 20 or more underground uranium mines within the Ambrosia Lake valley.

This report addresses the 1) concentrations of radon-222 (radon) in air, 2) those of long-lived radionuclides (natural uranium [uranium], thorium-230 [Th-230], radium-226 [Ra-226], lead-210 [Pb-210], and polonium-210 [Po-210]) in the uranium decay series in air particulates, vegetation, soil, and sediment; and 3) gamma dose (dose) rates at the facility. Existing data were evaluated for trends and, in the case of air particulates, compared to their respective effluent concentrations listed in Table 2 in Appendix B of 10 Code of Federal Regulations (CFR) 20. Review

Samples of air, vegetation, and soil are collected at the seven monitoring locations (Substation, Mill Diversion, Section 30W VH6, North Fence, Section 17 VH4, KGL North, and KGL South) shown in Figure 1-2. Samples of sediment are collected at the four locations (P-0, P-1, P-2, and P-3) shown in Figure 1-2. Dose rate measurement are made quarterly at eight locations, including Substation, Mill Diversion, Section 30W VH6, North Fence, Section 17 VH4 and 3 locations in Section 4 pond area.

2.0 Status of Decommissioning

The status of decommissioning at the facility is paramount to the utility of environmental monitoring. The mill decommissioning was initiated in the early 1990's with the collection and consolidation of tailing windblown material into Pond 3 and completed in 2016 with placement of the rock cover on Pond 2. The mill structures, tailings, Section 4 ponds, and windblown material has been remediated in accordance with U.S Nuclear Regulatory Commission (NRC)-approved plans. Several ponds where deep contamination existed also have been reclaimed in accordance with NRC-approved plans. The volume of remaining licensed material needing to be remediated, if any, is an insignificant fraction of what has been stabilized. The isolation and stabilization of licensed radioactive materials has largely precluded their redistribution into the environment.

3.0 Measurements in Environmental Media

This section addresses 1) radon concentrations in air and 2) radionuclide concentrations observed in airborne particulates, vegetation, soil, and sediment.

Table 2-1 lists by medium the lower limits of detection (LLDs) recommended in NRC Regulatory Guide (RG) 4.14 (NRC, 1980). Table 2-2 lists the effluent concentrations for air in 10 CFR 20, Appendix B for the relevant radionuclides. The values listed in these tables were used as part of the evaluation below.

2.1 Radon in Air

The environmental monitoring of radon in air is summarized as follows:

- Samples have been collected and analyzed quarterly.

- All concentrations are essentially constant based on their averages by year, as shown in Figure 2-1. Figure 2-1 also indicates that radon concentrations are lowest, about 0.5 to 1.0 picocuries per liter (pCi/L), at the Section 17 VH4 and Substation monitoring locations. Radon concentrations at the five other stations range from about 1.5 to 3.0 pCi/L. These concentrations are within the range of those measured regionally (U.S. Environmental Protection Agency [EPA], 1976).

- Figure 2-2 indicates that radon concentrations in air are generally higher in the 4th quarter at the KGL North, Mill Diversion. North Fence, Section 30W VH6, and KGL South monitoring locations.

2.2 Airborne Radioactive Particulates

The environmental monitoring of radioactive particulates in air is summarized as follows:

- Samples have been collected and analyzed quarterly.

- All concentrations are essentially constant based on their averages by year, as shown in Figure 2-3.

- Figures 2-4 through 2-7 indicate that airborne particulate concentrations are highest during the second quarter. This is likely due to the higher wind speeds that generally occur in April and May. The increase in the concentrations of air particulates in 2015 at the North Fence location is likely due to increased truck traffic on the site haul roads during remediation activities at the time.

- The average annual concentrations of uranium, Th-230, Ra-226, and Pb-210 are at least two orders of magnitude below their respective, most conservative effluent concentrations listed in 10 CFR 20, Appendix B.

2.3 Vegetation

The environmental monitoring of vegetation at the facility is summarized as follows:

- Samples have been collected and analyzed quarterly (with the exception of the 1st quarter due to the lack of vegetation in the winter months).

- As indicated on Figure 2-8, all concentrations are essentially constant and not increasing based on their averages by year. There is one apparent decrease in the concentration of Pb-210, which may be due to errors and/or uncertainty in the laboratory analysis of the 2014 samples, given the very low level of measured radioactivity and challenge of isolating Pb-210 from the sample matrix. Alternatively, this could be due to the placement of the frost and radon barrier on Cell 2, which began in 2013. Figures 2-9 through 2-12 also show that the concentrations are constant and not increasing.

- Many of the reported concentrations are below laboratory LLDs.

2.4 Soil

The environmental monitoring of soil is summarized as follows:

- Samples have been collected and analyzed annually.

- The concentrations of the individual radionuclides are essentially constant and not increasing across the eight years of monitoring, as shown in Figures 2-13 through 2-16.

- The average concentrations of uranium at each location range from 0.6 to 7.9 picocuries per gram (pCi/g).

- The average concentrations of Th-230 at each location range from 0.7 to 12.7 pCi/g. The high end of the range is due to one sample result (50 pCi/g at the Mill Diversion location in 2008).

- The average concentrations of Ra-226 at each location range from 1.7 to 164 pCi/g. The high end of the range is due to one sample result (1,300 pCi/g at the North Fence location in 2008). The high end of the range is 5.3 pCi/g, when this results is excluded.

- The average concentrations of Pb-210 at each location range from 0.2 to 3.9 pCi/g.

Excluding one result for Ra-226 in 2008, the average concentrations of the long-lived radionuclides in soil are below their respective cleanup criteria established in the Decommissioning Plan (KOMEX, 2006).

2.5 Sediment

The environmental monitoring of sediment is summarized as follows:

- Samples have been collected and analyzed annually. Location P-0 was not sampled in 2015 because it was eliminated by earth contouring activities in 2014 (i.e., it was no longer in a drainage).

- The concentrations of the individual radionuclides are relatively constant across the eight years of monitoring, as shown in Figures 2-17 through 2-20.

- The average concentrations of uranium at each location range from 0.6 to 12.6 pCi/g.

- The average concentrations of Th-230 at each location range from 0.9 to 21.3 pCi/g.

- The average concentrations of Ra-226 at each location range from 0.7 to 20.1 pCi/g.

- The average concentrations of Pb-210 at each location range from 0.7 to 10.5 pCi/g.

2.6 External Dose Rates

The monitoring of external dose rates is summarized as follows:

- Net dose rates (location dose rate minus a control dosimeter response) were measured quarterly, using optically stimulated luminescent (OSL) dosimeters. From here on, dose rate implies net dose rate.

- Dose rates, as shown as annual net averages on Figure 2-21, range from not detected (less than the control response) to 5 millirem (mrem) at six of the eight monitoring locations. Dose rates range from 10 to 15 mrem at the Section 30W VH6 monitoring location. Dose rates below the control response are reported as 0 mrem in Figure 2-21. This summary excludes the dose rates observed in 2015. There is an increase in dose rates in 2015 due to a change in the control dosimeter response that is likely due to a change in its storage location. Increases in other parameters; e.g., radionuclide concentrations in soil, that could increase external dose rates did not increase in 2015 at the monitoring locations. All external dose rates are below the annual limit on dose to the public (100 mrem).

- There appear to be no seasonal trends in the dose rates, given an evaluation of the data presented in Figure 2-22.

4.0 Conclusions

The following conclusions are presented based on the status of decommissioning at the facility:

- The mill was decommissioned from the early 1990's to 2016.
- Licensed material at the former mill and in surrounding areas was essentially consolidated in impoundments at the facility, in accordance with NRC-approved plans.
- As of April 2016, the tailings impoundments have radon barriers and rock covers in place.
- The isolation and stabilization of licensed radioactive materials has largely precluded their redistribution into the environment.
- The volume of residual licensed material subject to further remediation, if any, is an insignificant fraction of what has been remediated.

These facts alone justify the termination of the environmental monitoring program, since the intent of the program is to monitor releases of licensed material.

The following conclusions are presented based on a qualitative assessment of the concentrations of radon in air and uranium series radionuclides in air, vegetation, soil, and sediment determined under the environmental monitoring program at the facility:

- The concentrations of these radionuclides are low, as discussed above.
- Given that the facility has undergone decommissioning and the largest sources of licensed material have been isolated from the environment, the concentrations are not likely to increase.
- Continuing to monitor any of the environmental media addressed in this report, given the current state of the facility and the activities therein, would not provide useful information regarding the impacts of licensed activities on the environment.

In the future, if licensed activity at the facility poses a potential occupational exposure or release of licensed radioactive materials to the environment, a radiation work permit will be issued that describes the hazards, controls to mitigate hazards, and monitoring techniques used to evaluate the controls. In these cases, components of the current environmental monitoring program may be re-instituted for the duration of the activity.

5.0 References

EPA, 1976. Report of Ambient Outdoor Radon and Indoor Radon Progeny Concentrations during November 1975 at Selected Locations in the Grants Mineral Belt, New Mexico. Technical Note ORP/LV-76-4, June 1976.

KOMEX, 2006. Soil Decommissioning Plan, Rio Algom Mining LLC, Ambrosia Lake Facility, May, 1, 2006.

TABLES

Table 1. Lower Limits of Detection Recommended in NRC Regulatory Guide 4.14.

	RG 4.14 Recommended LLDs by Medium		
Radionuclide	Air (µCi/ml)	Soil and Sediment (µCi/g)	Vegetation (µCi/kg)
Uranium	$1x10^{-16}$	$2x10^{-7}$	$2x10^{-7}$
Th-230	$1x10^{-16}$	$2x10^{-7}$	$2x10^{-7}$
Ra-226	$1x10^{-16}$	$2x10^{-7}$	$5x10^{-8}$
Pb-210	$2x10^{-15}$	$2x10^{-7}$	$1x10^{-6}$
Po-210	NA	NA	$1x10^{-6}$
Rn-222	$2x10^{-10}$	NA	NA

Notes:
LLD = lower limit of detection
µCi/g = microcuries per gram
µCi/kg = microcuries per kilogram
µCi/ml = microcuries per milliliter
NA = not applicable

Table 2. 10 CFR 20 Effluent Concentrations for Air

Radionuclide	10 CFR 20 Effluent Concentration in Air (µCi/ml)
Uranium	3×10^{-12a}
Th-230	2×10^{-14a}
Ra-226	NA
Pb-210	6×10^{-13}

Notes:
[a]Most conservative effluent concentration.
NA = not applicable
µCi/ml = microcuries per milliliter

FIGURES

Figure 1-1. Location of Ambrosia Lake Facility

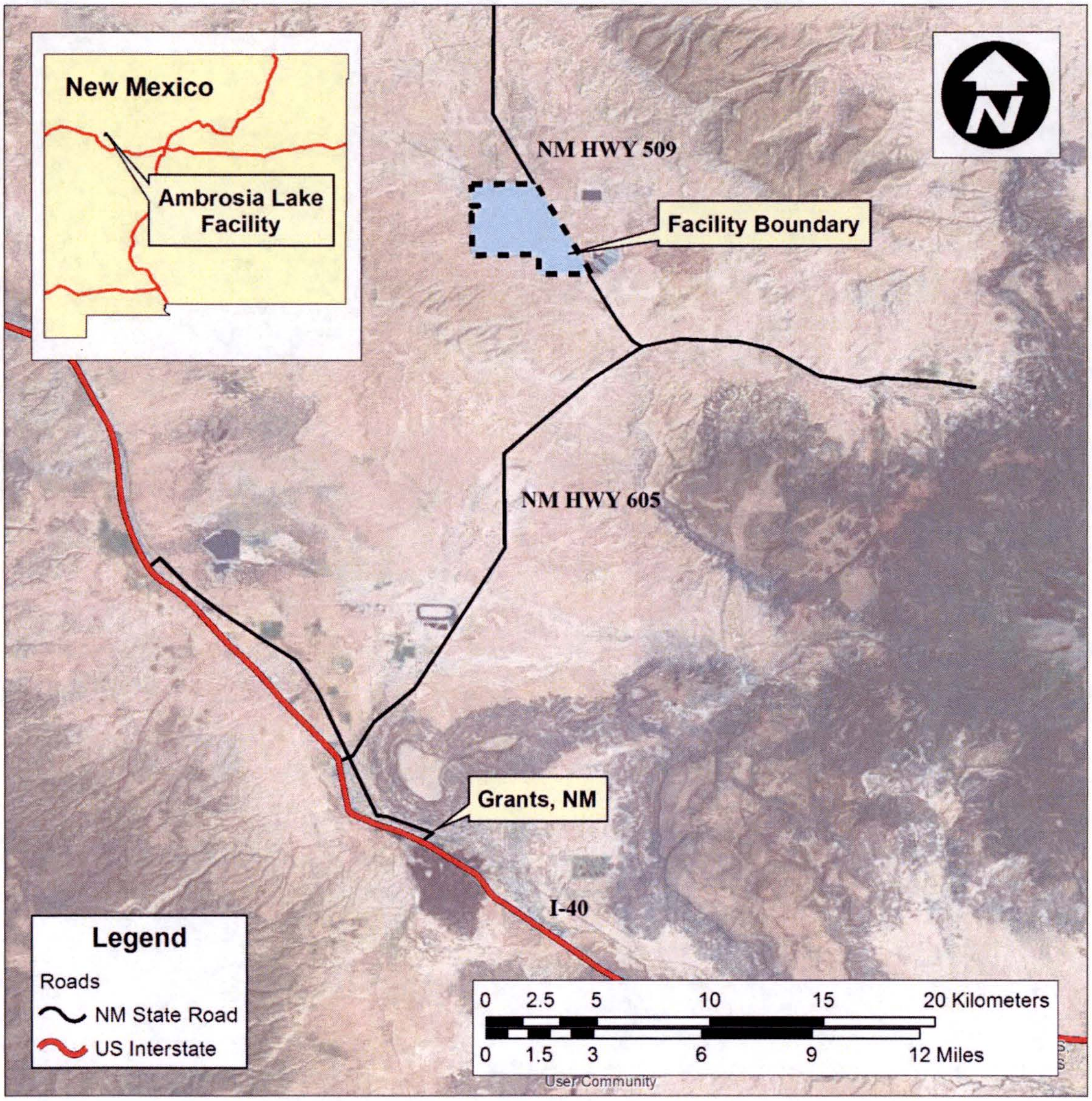

Figure 1-2. Environmental Monitoring Locations

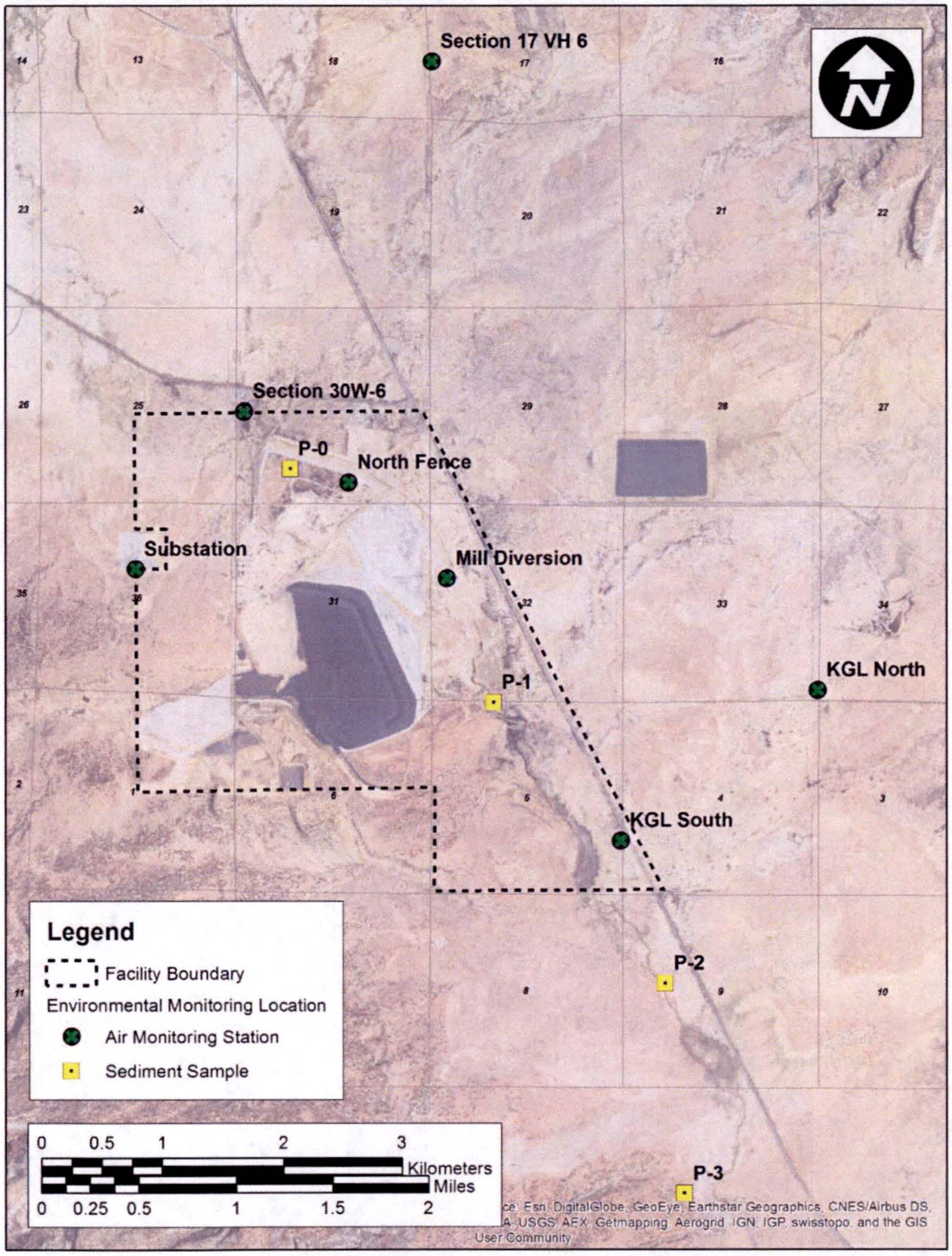

Figure 2-1. Annual Average Airborne Concentrations of Radon (2008-2015)

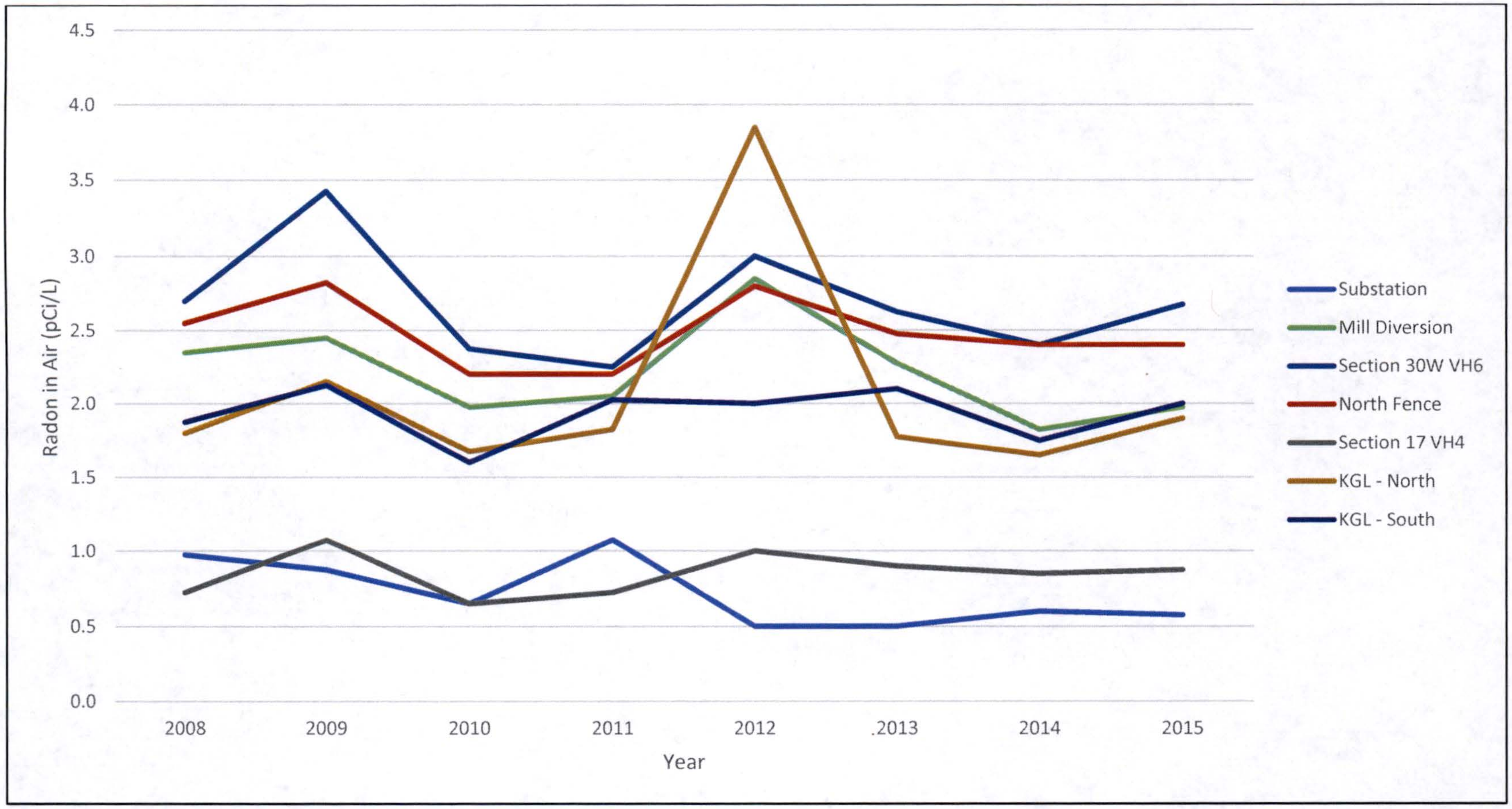

Figure 2-2. Quarterly Airborne Concentrations of Radon (2008-2015)

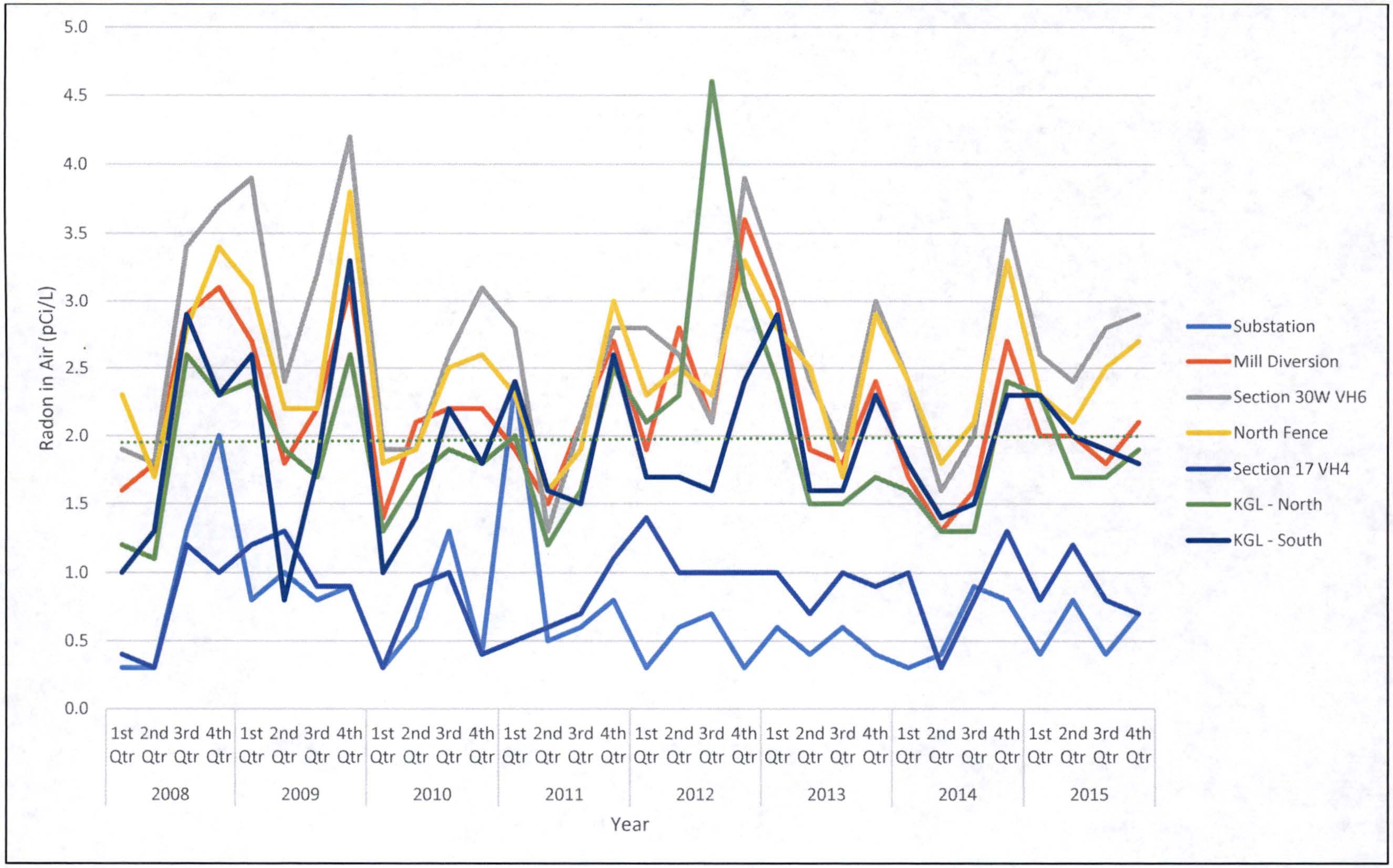

Figure 2-3. Annual Average Airborne Concentrations of Long-Lived Radionuclides in the Uranium Series (2008-2015)

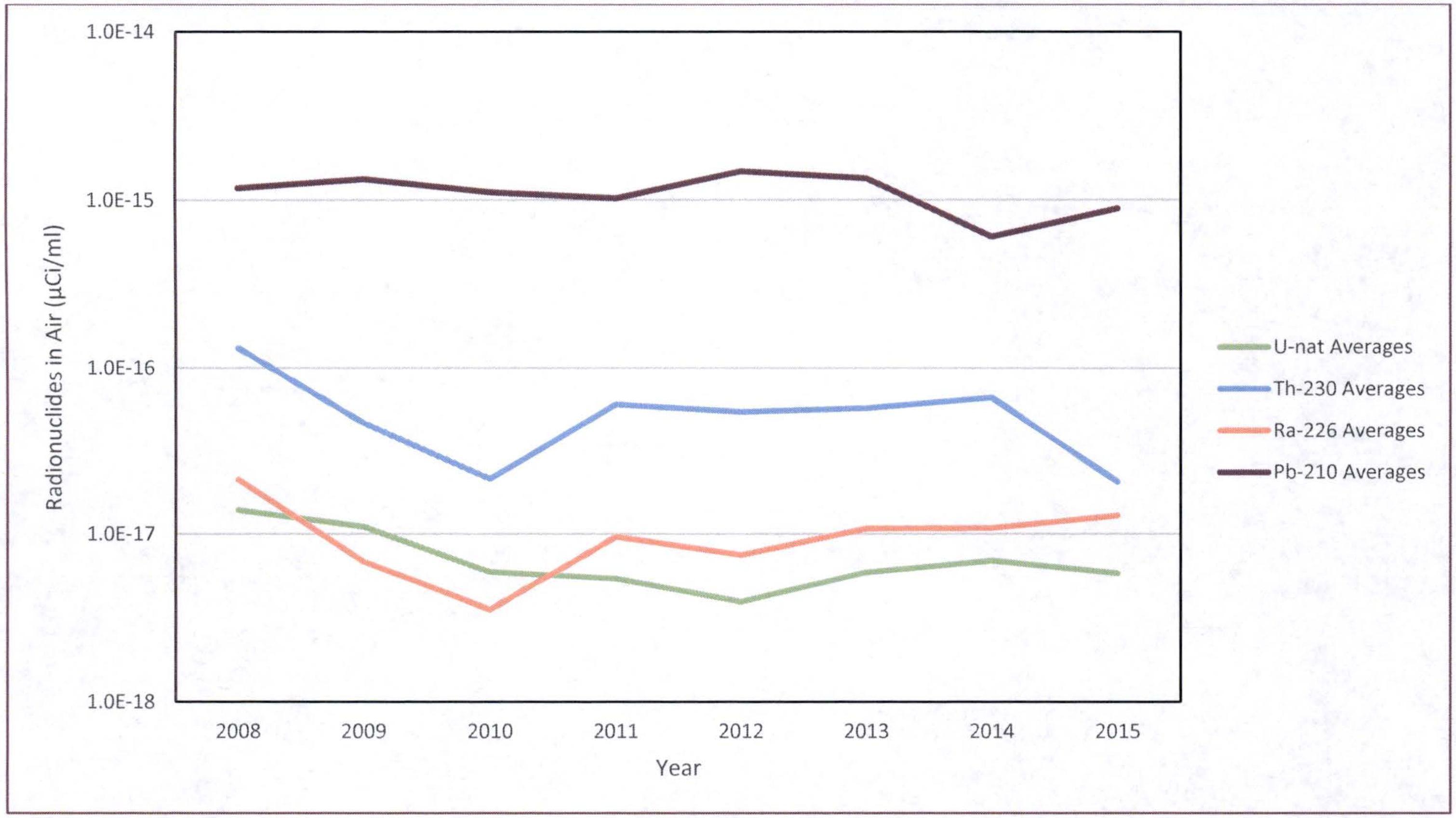

Figure 2-4. Quarterly Airborne Concentrations of Natural Uranium (2008-2015)

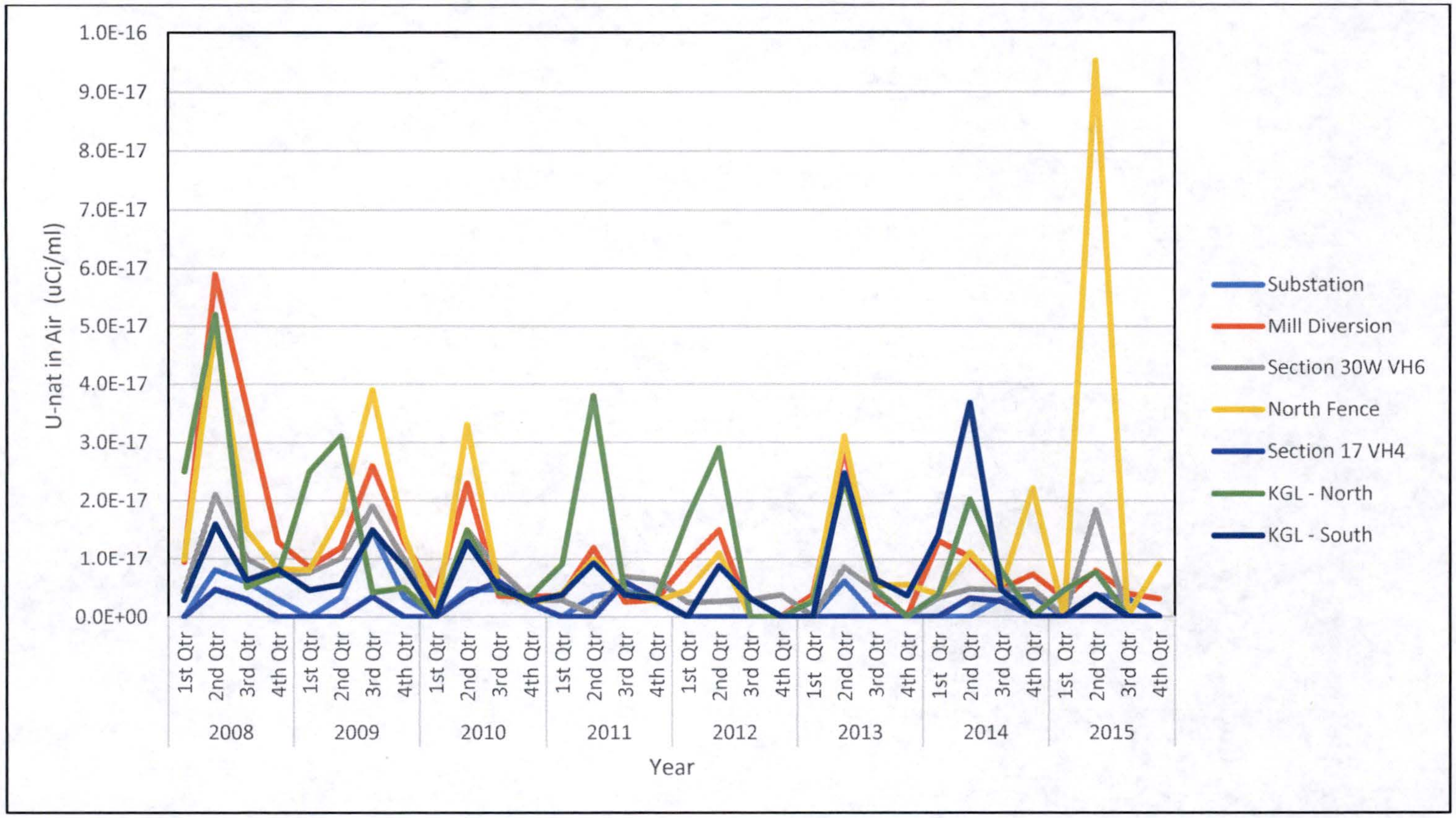

Figure 2-5. Quarterly Airborne Concentrations of Thorium-230 (2008-2015)

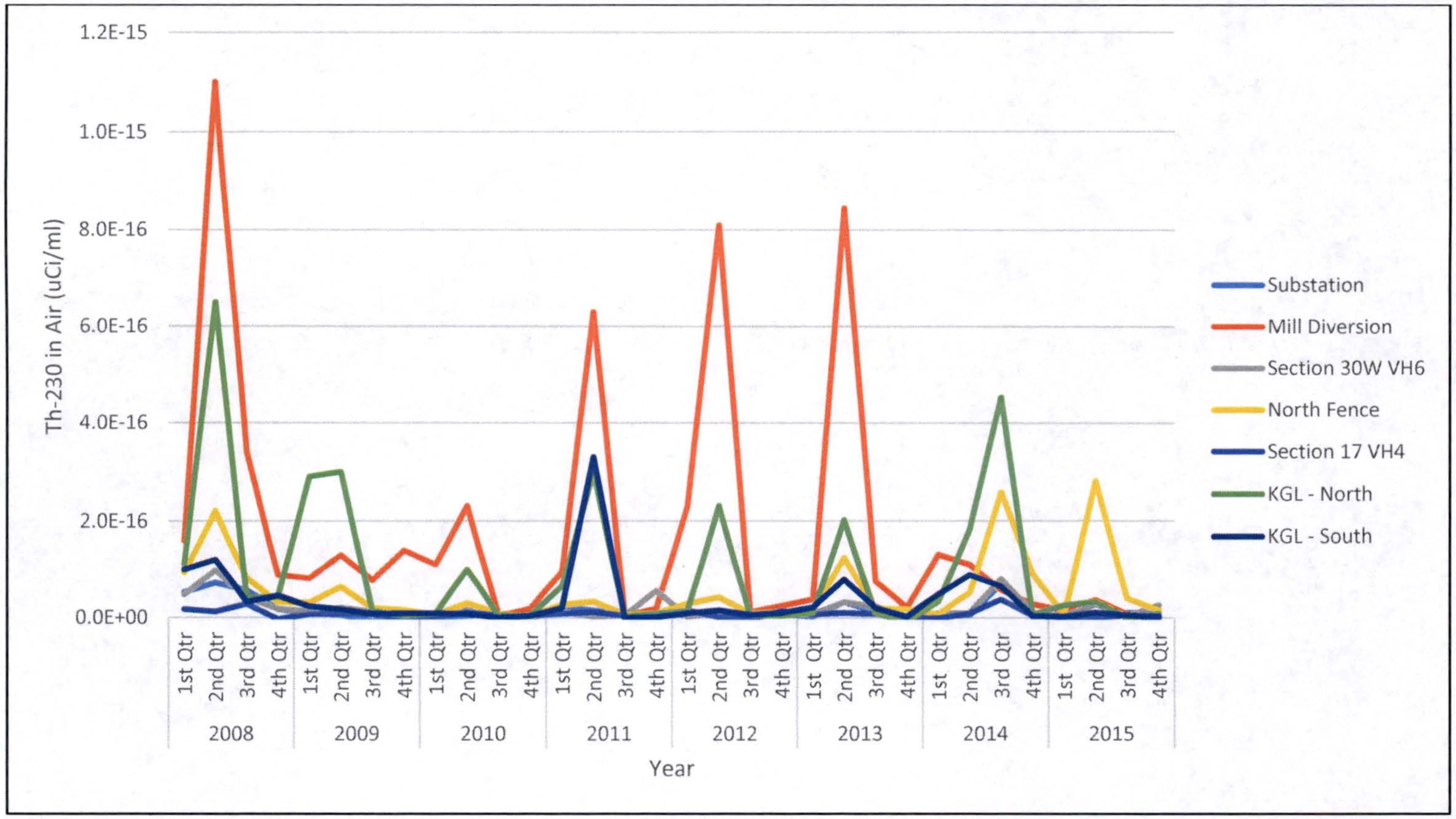

Figure 2-6. Quarterly Airborne Concentrations of Radium-226 (2008-2015)

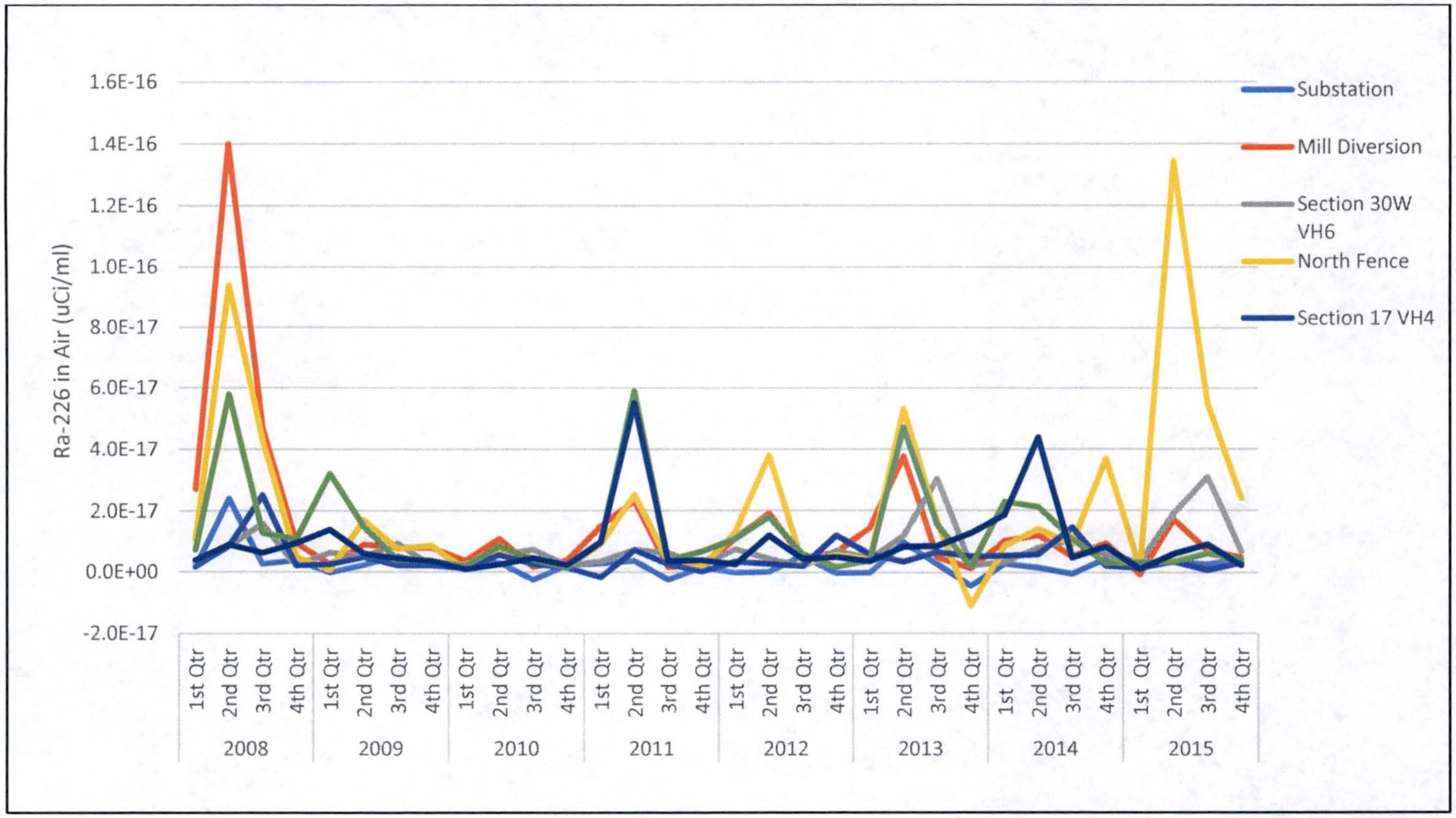

Figure 2-7. Quarterly Airborne Concentrations of Lead-210 (2008-2015)

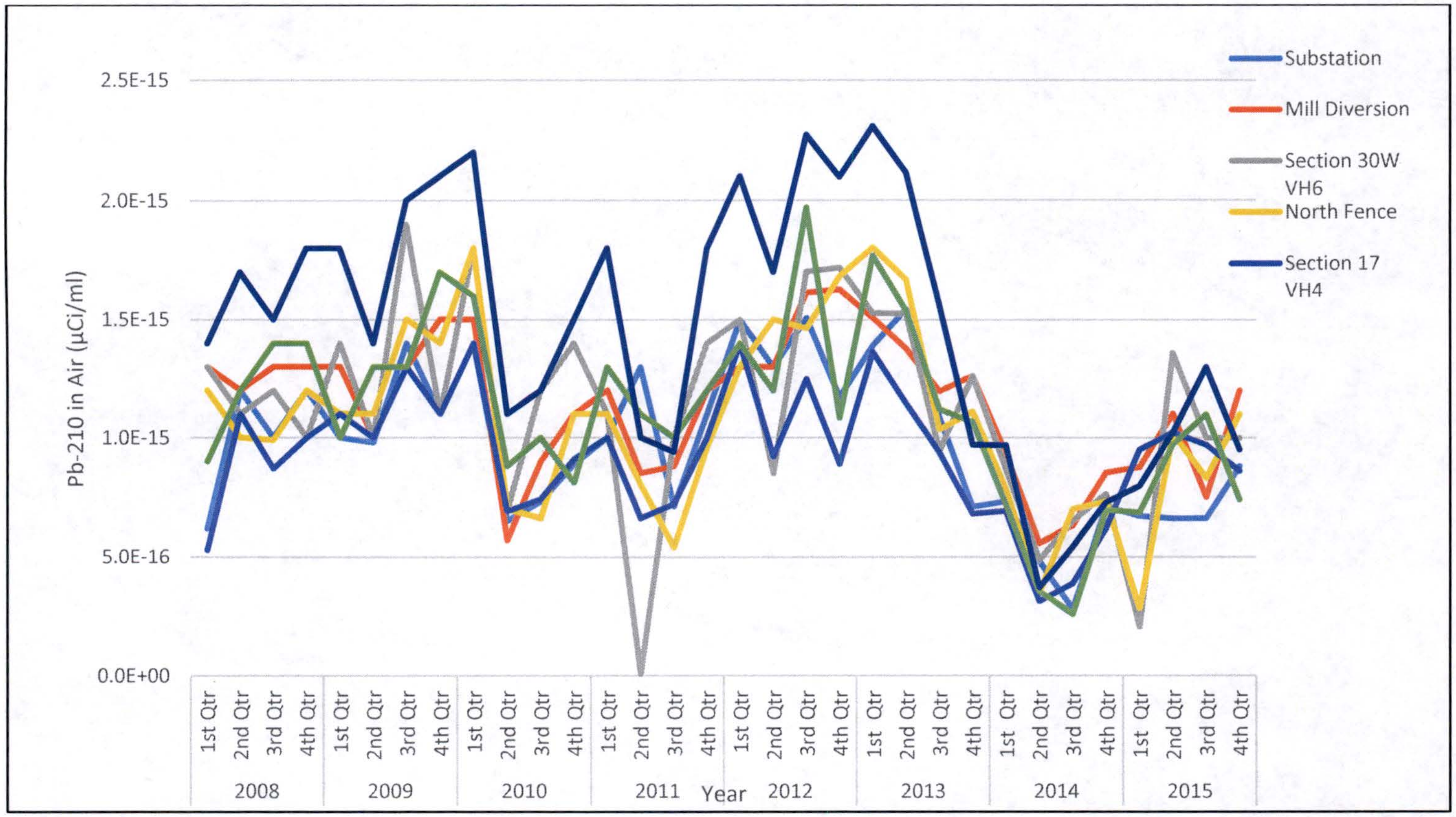

Figure 2-8. Annual Concentrations of Long-Lived Radionuclides in the Uranium Series in Vegetation (2008-2015)

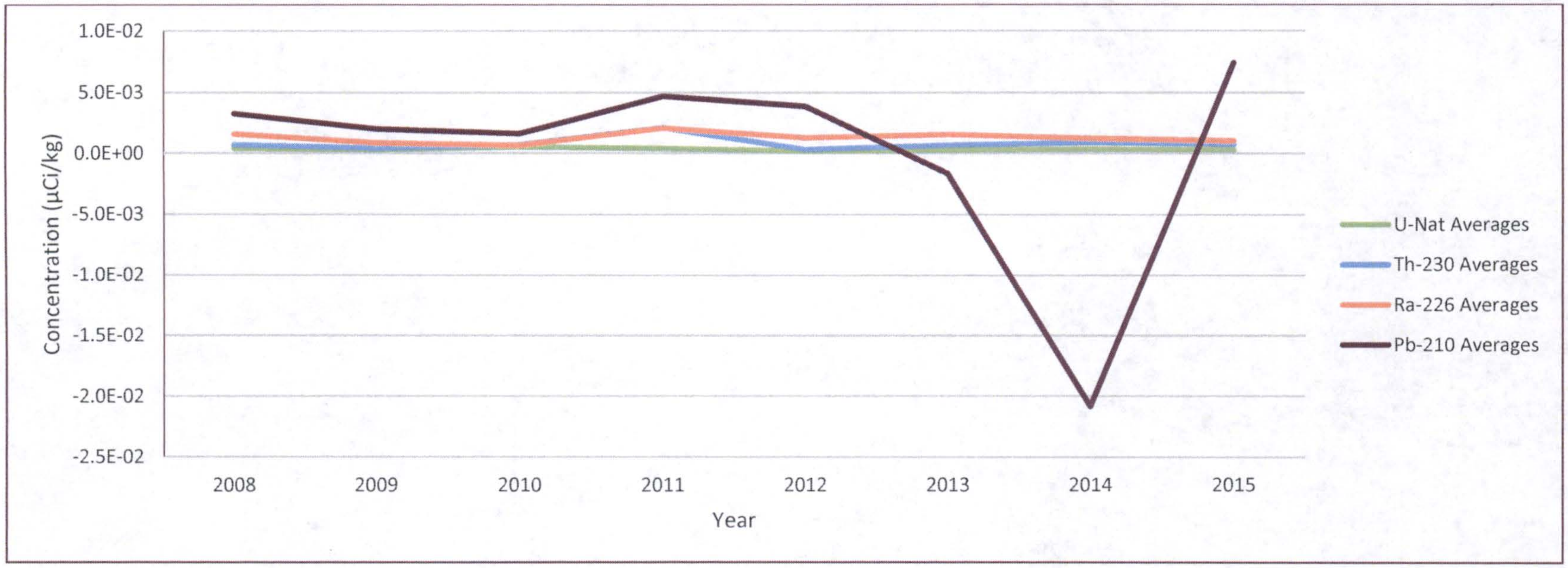

Figure 2-9. Quarterly Concentrations (µCi/kg) of Natural Uranium in Vegetation (2008-2015)

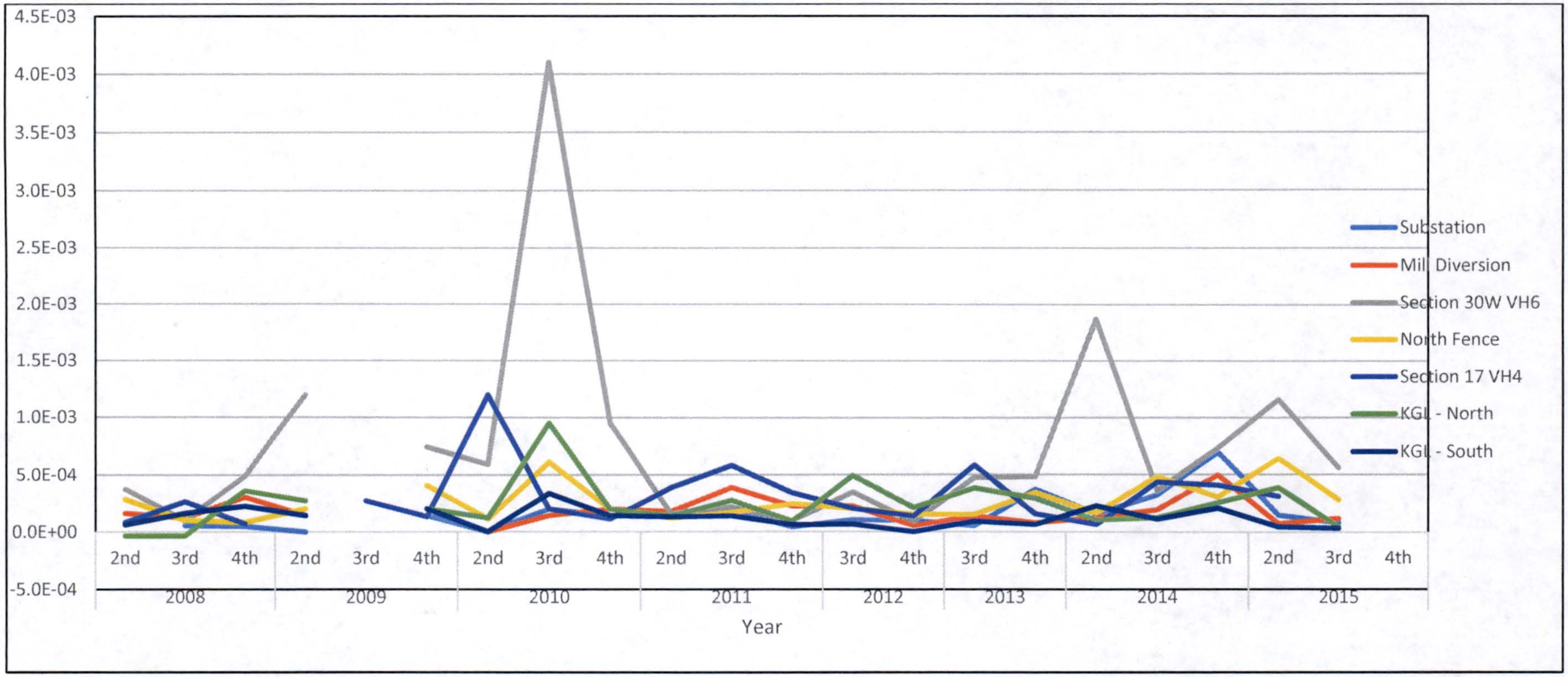

Figure 2-10. Quarterly Concentrations (µCi/kg) of Thorium-230 in Vegetation (2008-2015)

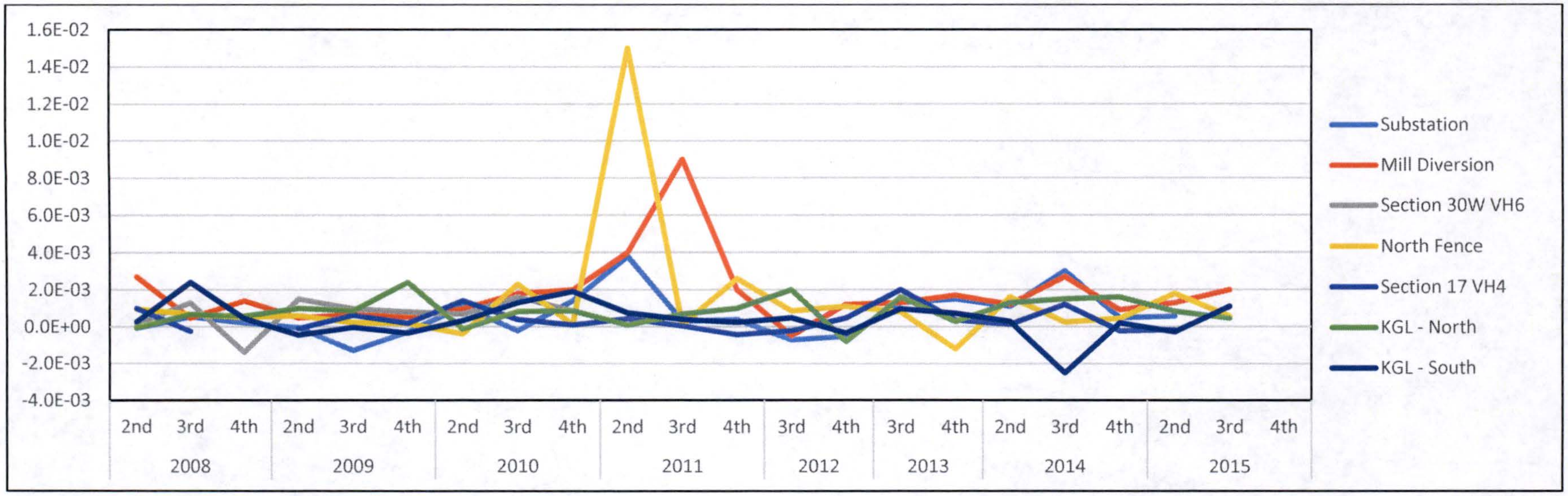

Figure 2-11. Quarterly Concentrations (µCi/kg) of Radium-226 in Vegetation (2008-2015)

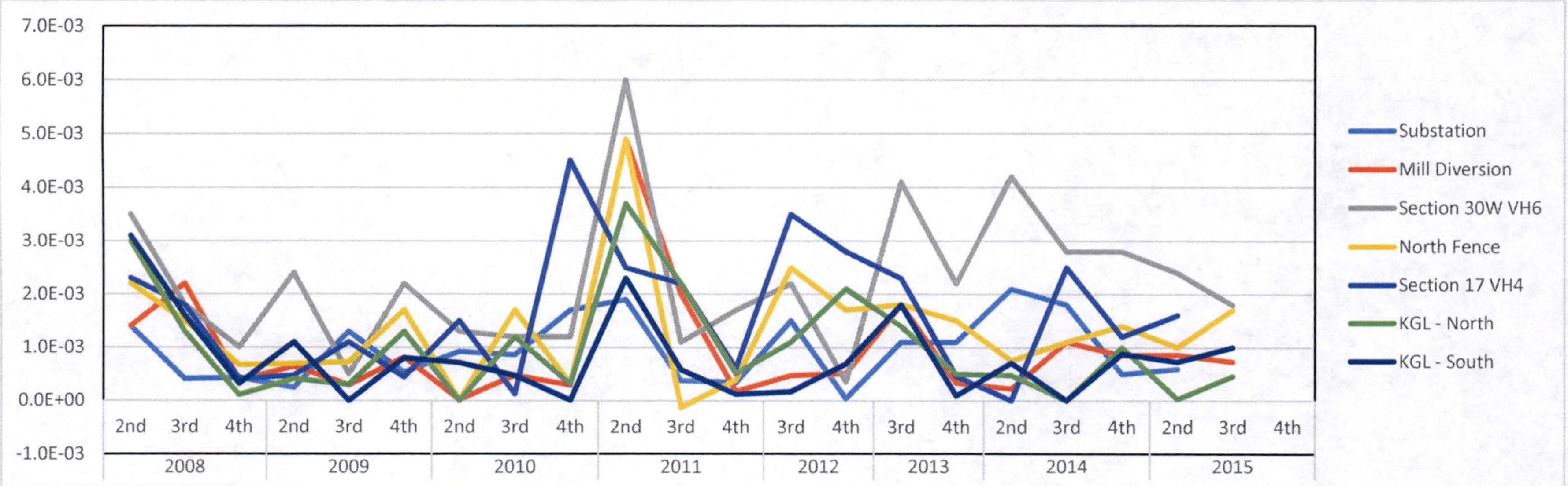

Figure 2-12. Quarterly Concentrations (µCi/kg) of Lead-210 in Vegetation (2008-2015)

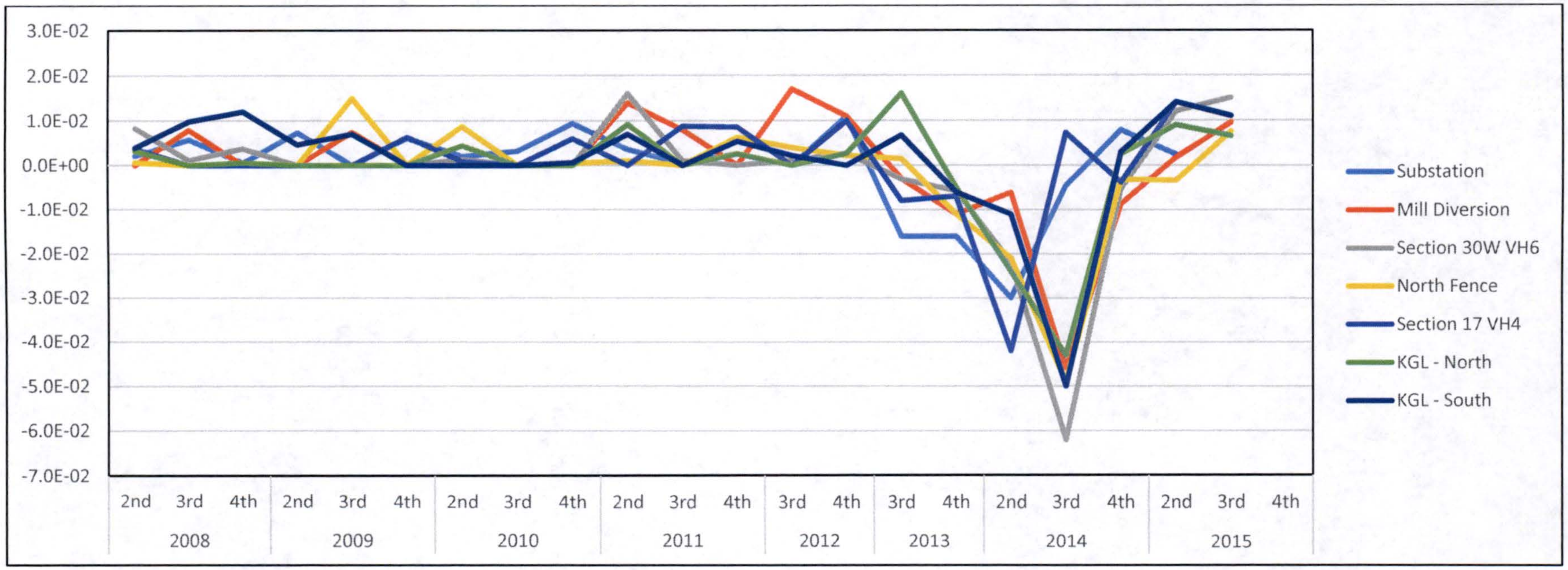

Figure 2-13. Annual Concentrations of Natural Uranium in Soil (2008-2015)

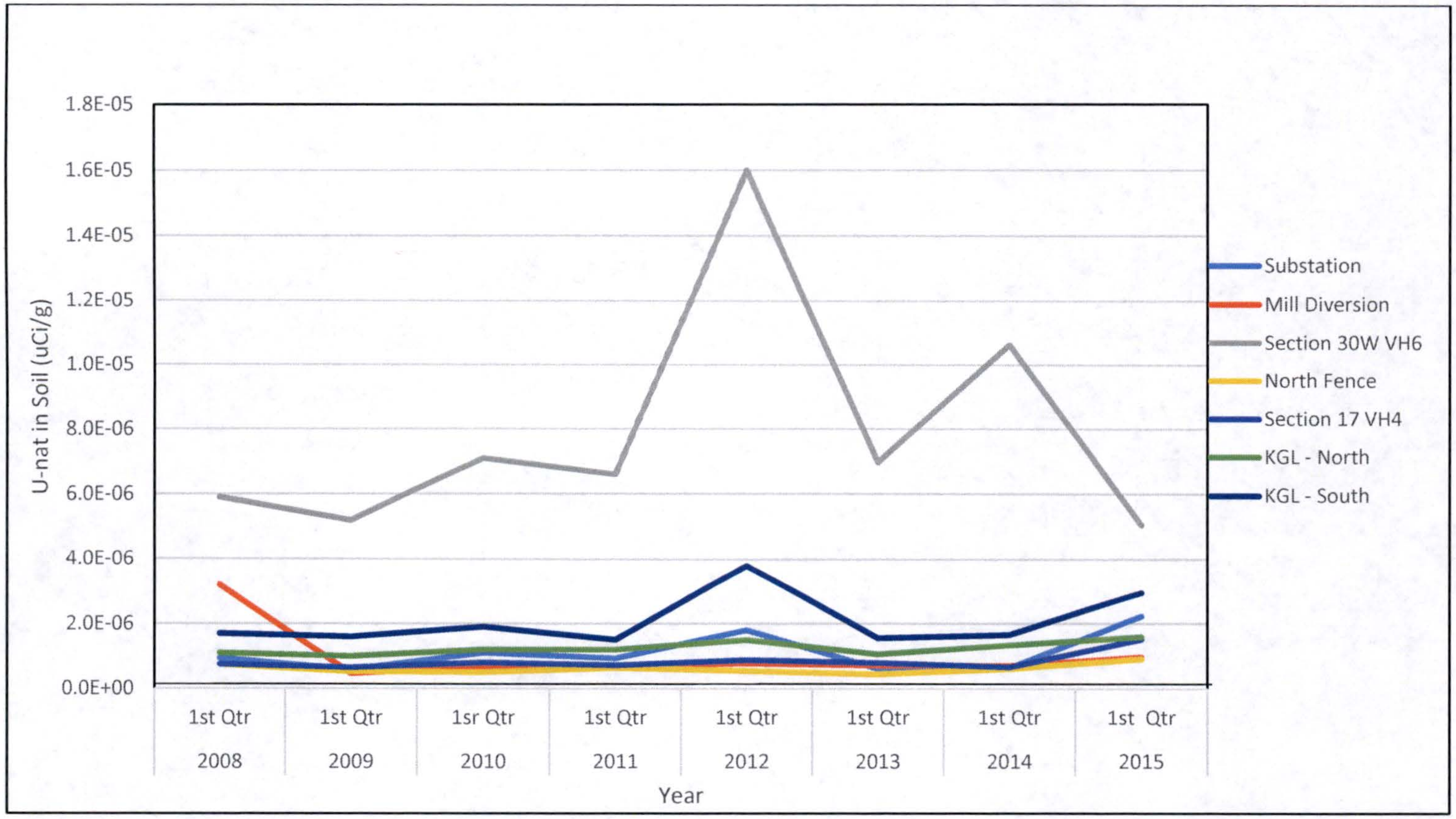

Figure 2-14. Annual Concentrations of Thorium-230 in Soil (2008-2015)

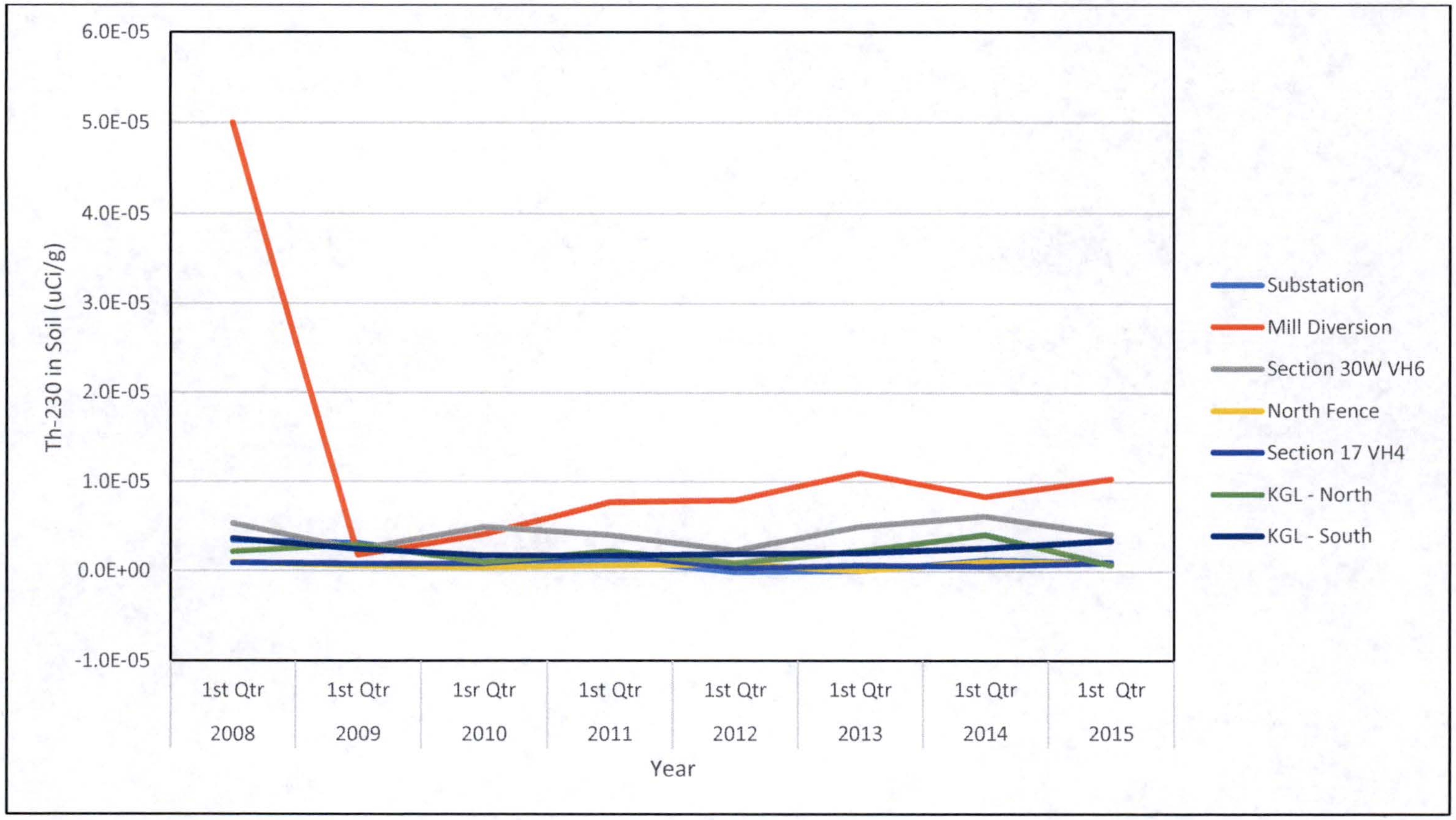

Figure 2-15. Annual Concentrations of Radium-226 in Soil (2008-2015)

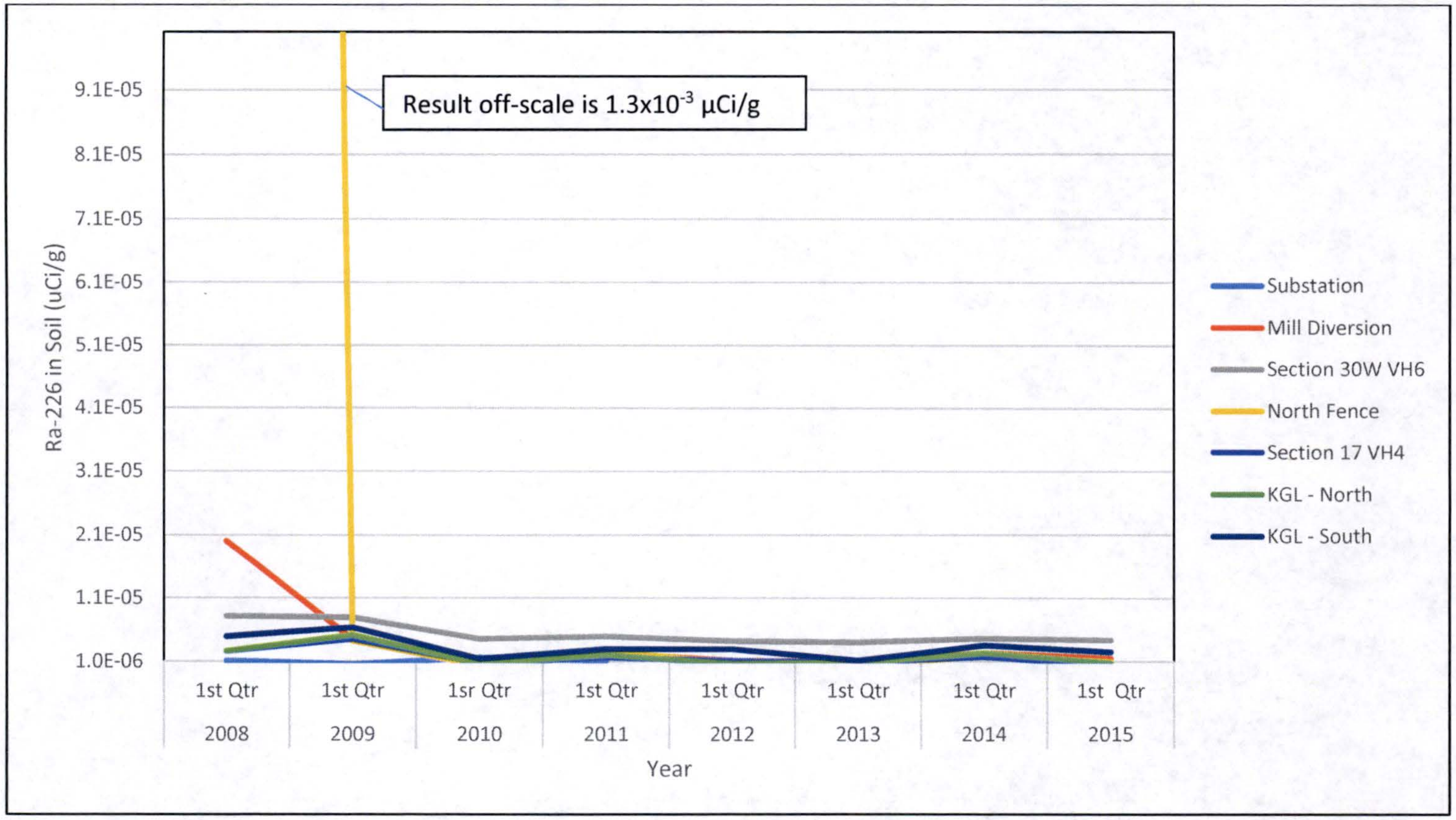

Figure 2-16. Annual Concentrations of Lead-210 in Soil (2008-2015)

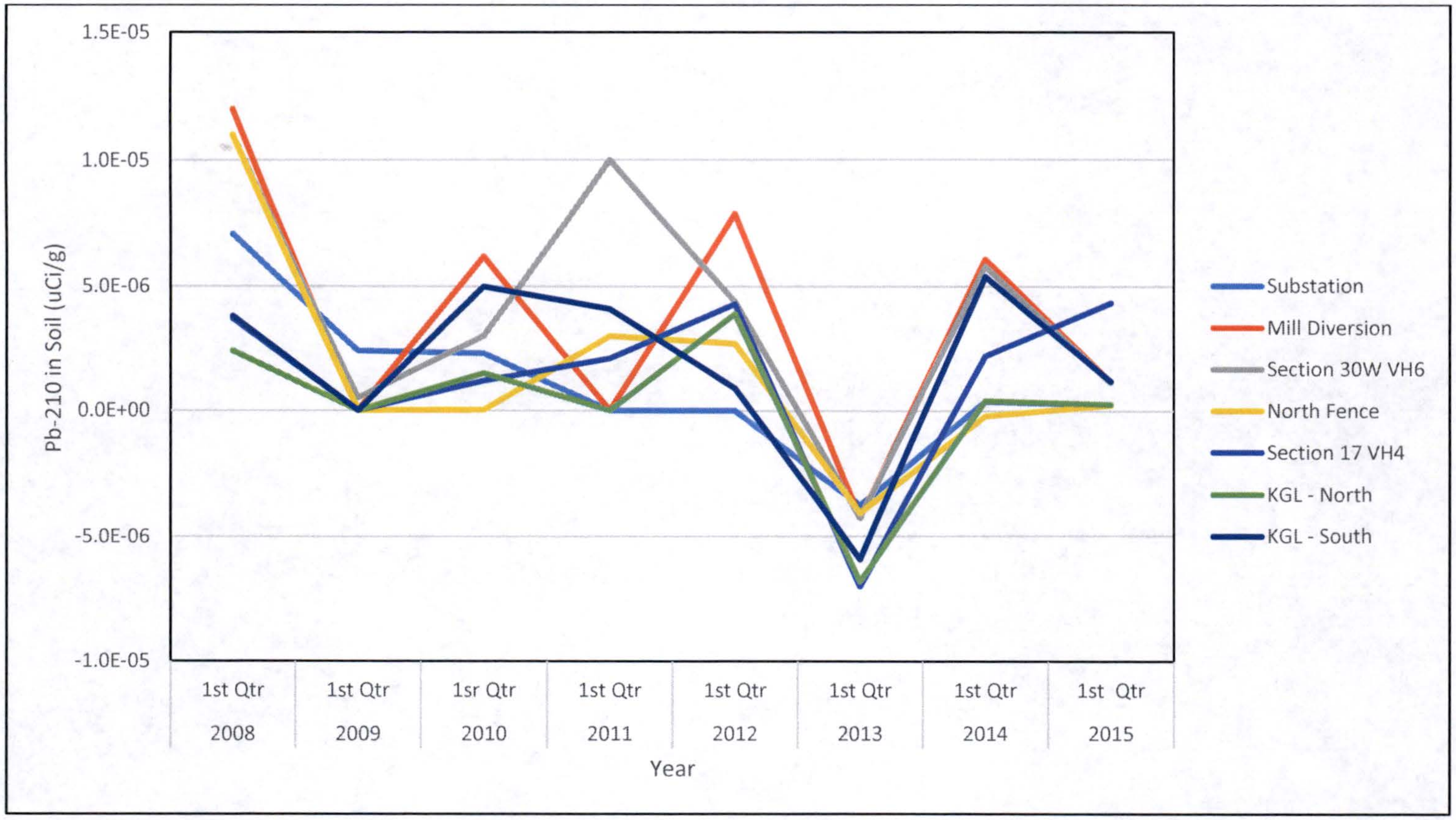

Figure 2-17. Annual Concentrations of Natural Uranium in Sediment (2008-2015)

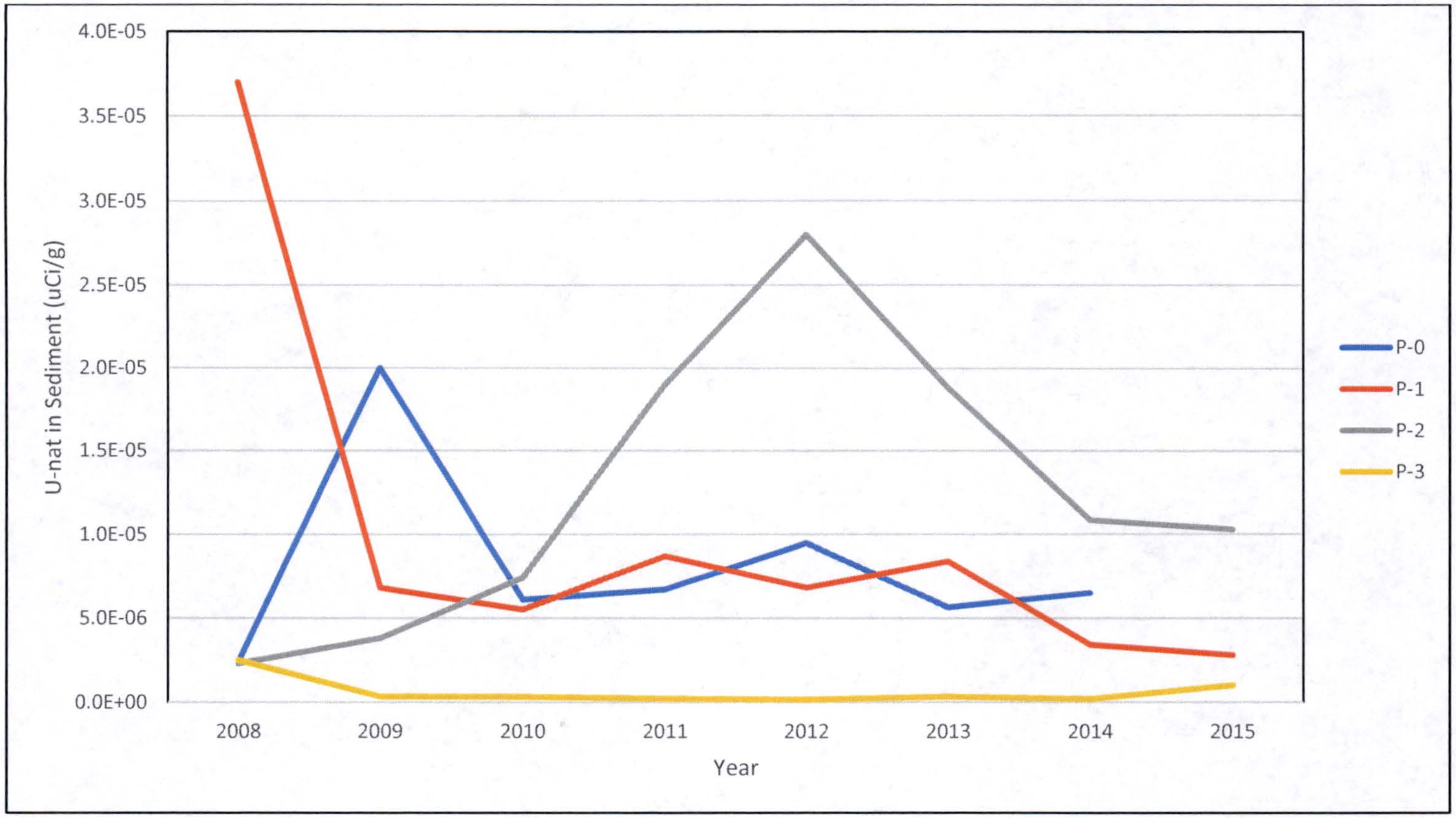

Figure 2-18. Annual Concentrations of Thorium-230 in Sediment (2008-2015)

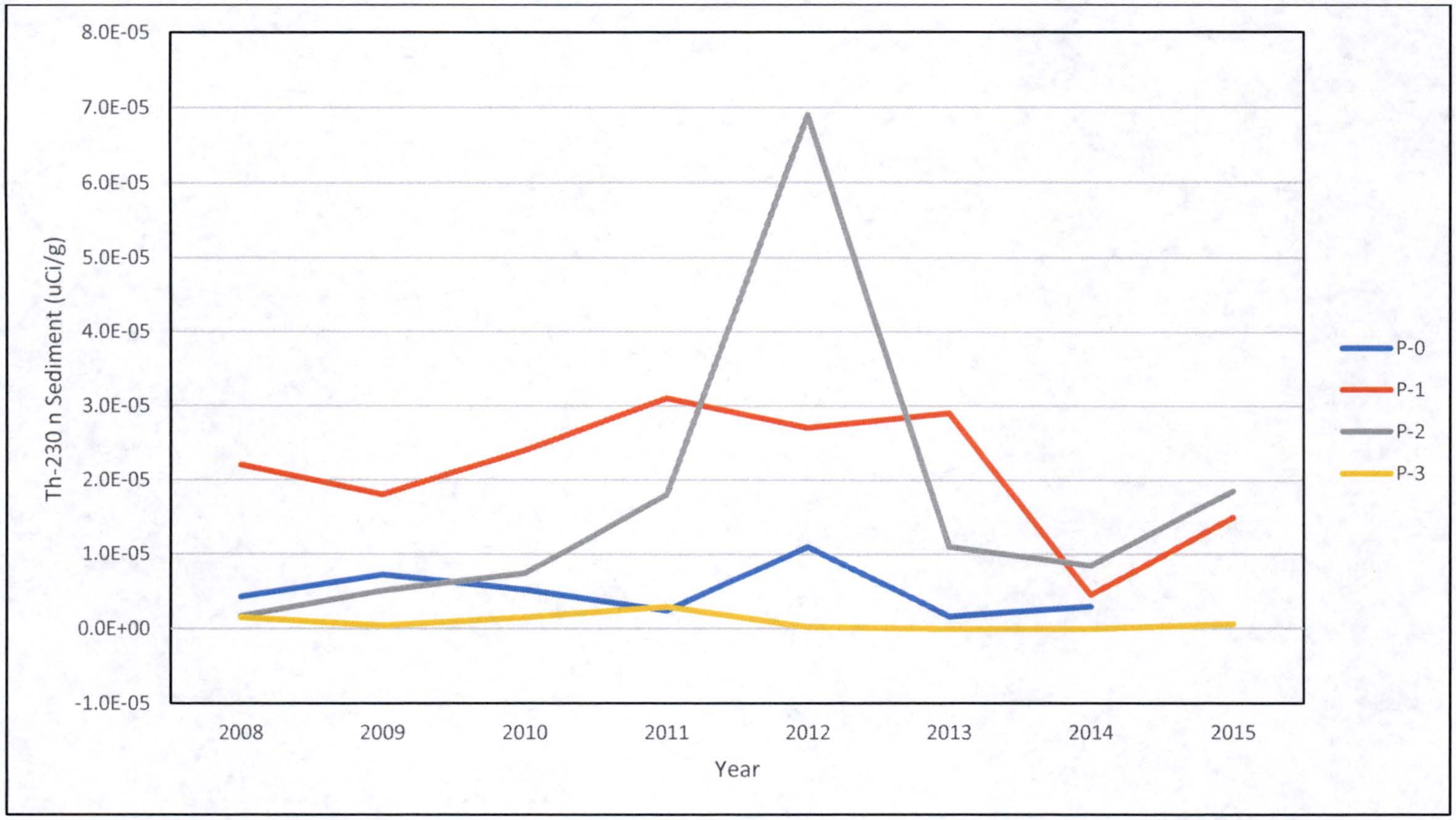

Figure 2-19. Annual Concentrations of Radium-226 in Sediment (2008-2015)

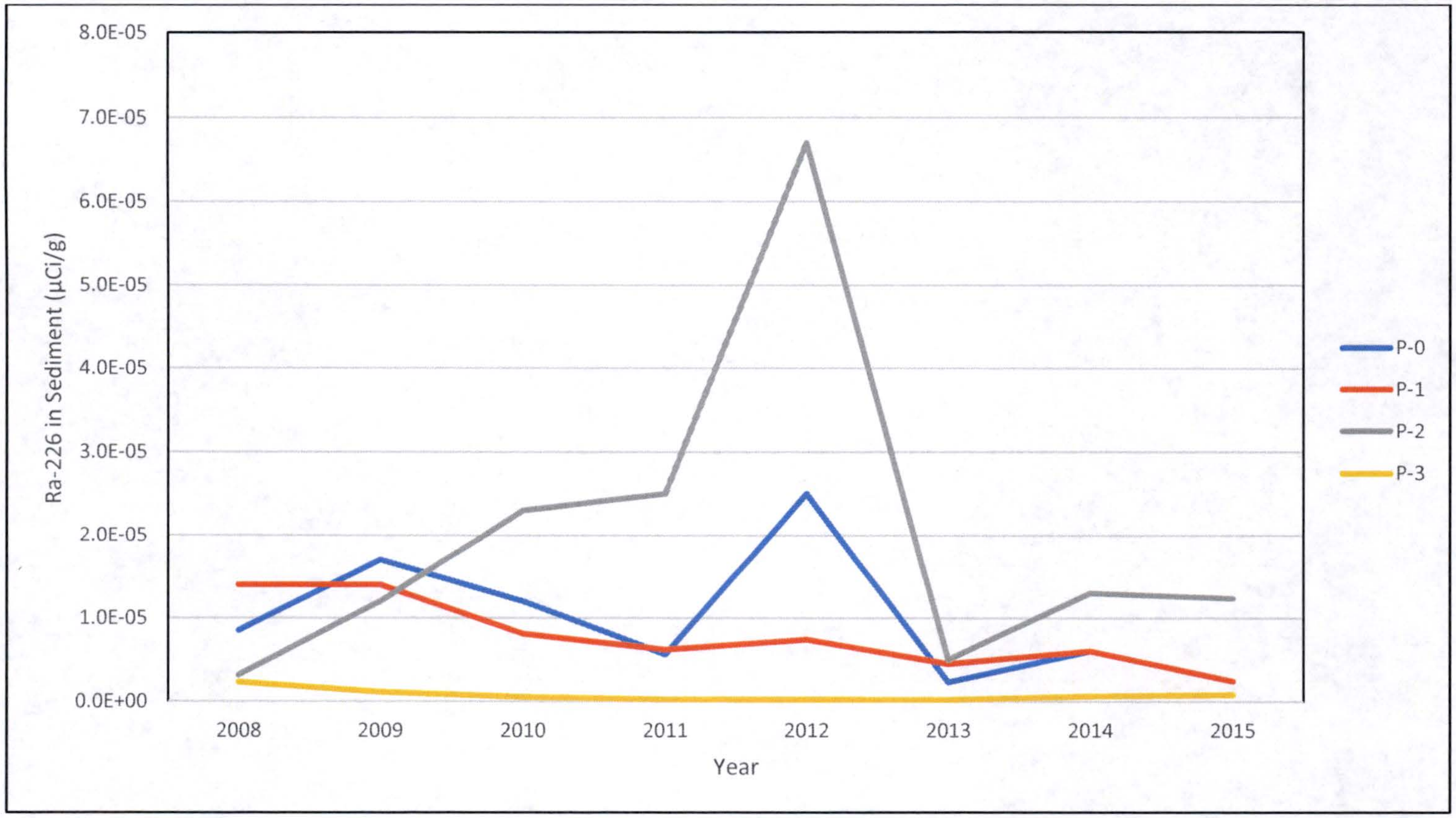

Figure 2-20. Annual Concentrations of Lead-210 in Sediment (2008-2015)

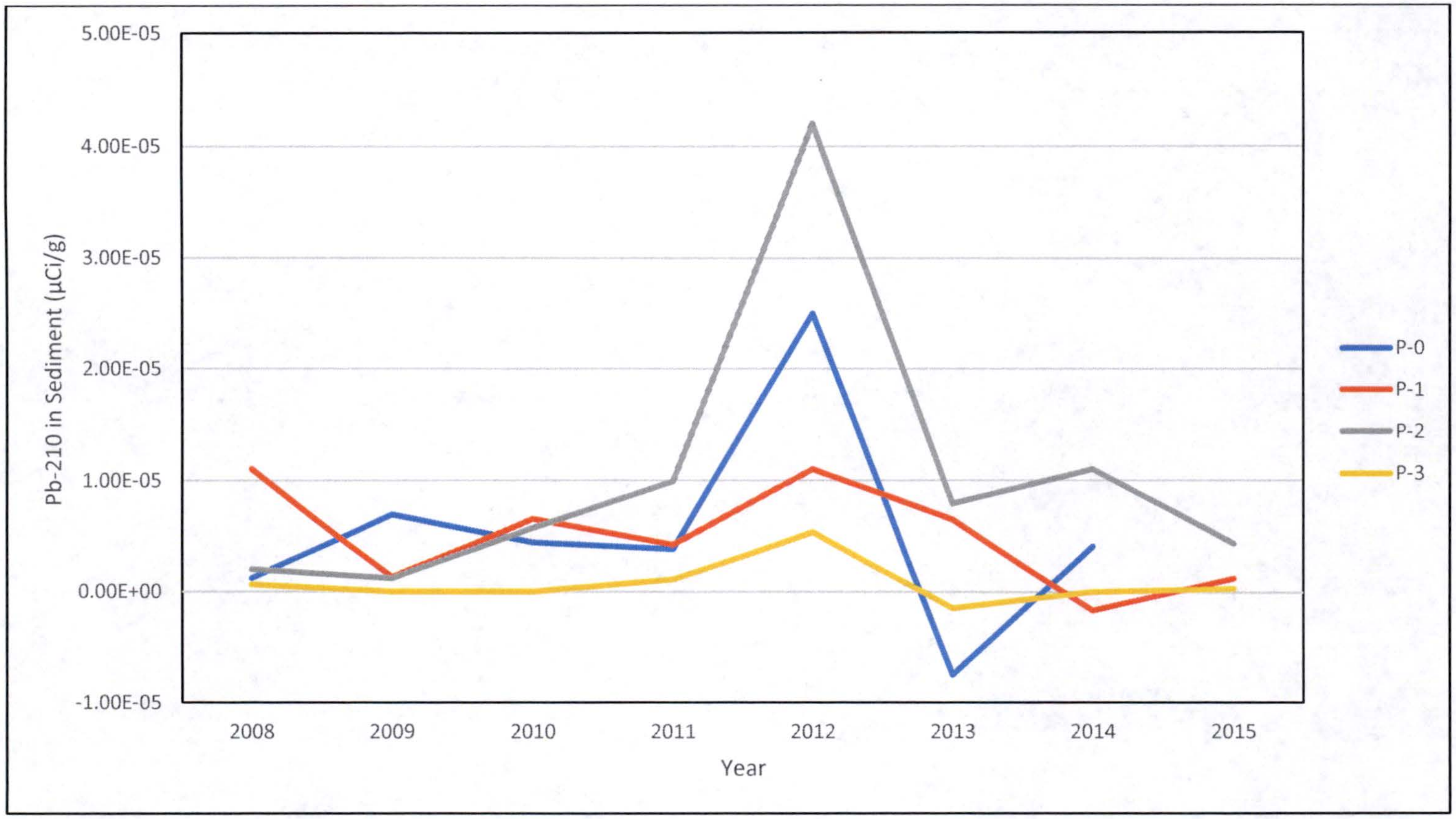

Figure 2-21. Annual Dose Rates (2008-2015)

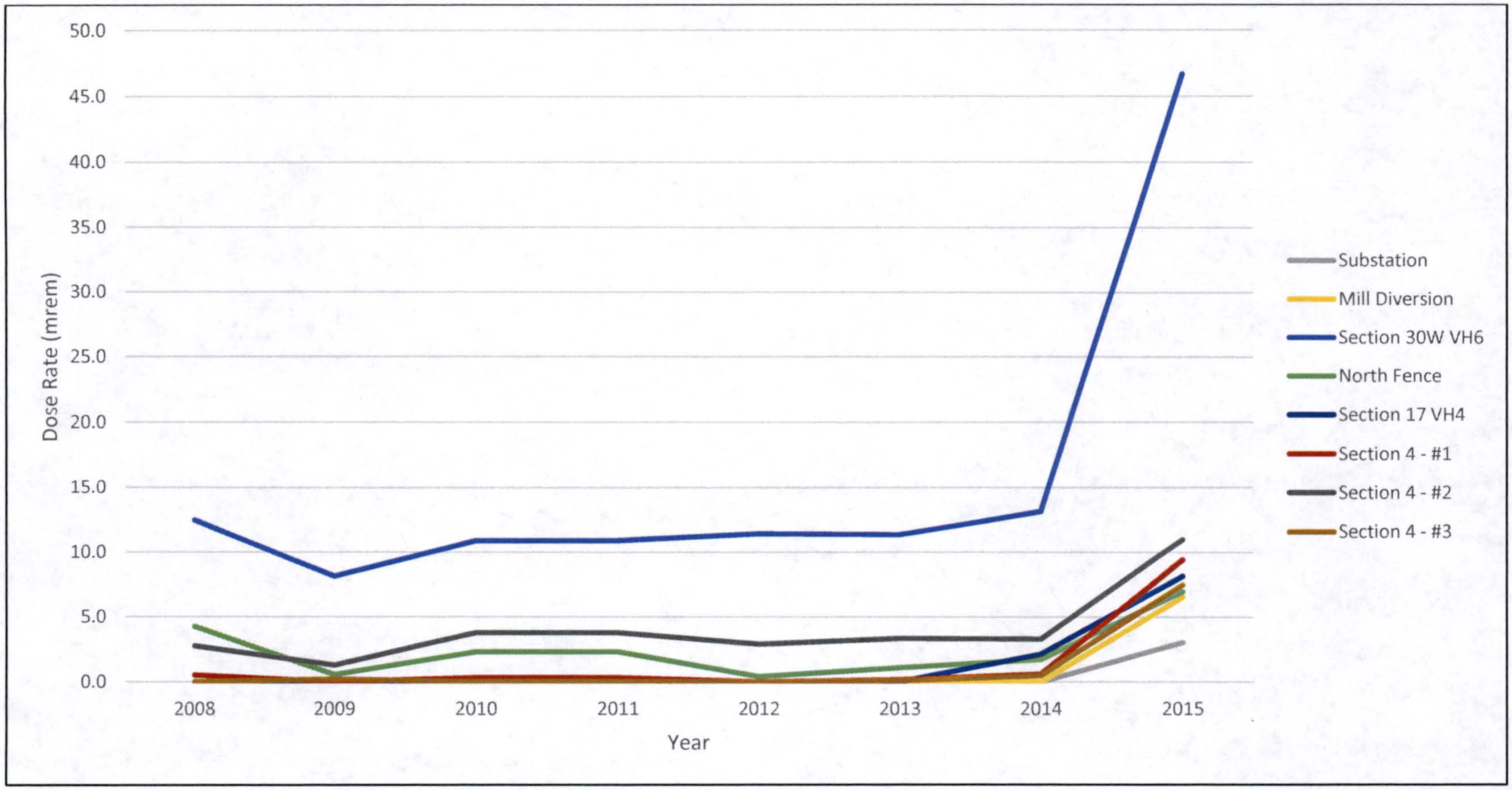

Figure 2-22. Quarterly Dose Rates (2008-2015)